DOCUMENT RESUME

ED 476 261 FL 027 668

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TITLE	The Influence of Pronunciation Instruction on the Production of English Word-Final Consonants by Brazilian Learners.
PUB DATE	2002-00-00
NOTE	31p.; Paper presented at the TexFlec Conference (Austin, TX, March 29-30, 2002).
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Consonants; *English (Second Language); Foreign Countries; Higher Education; Phonology; *Pronunciation Instruction; Second Language Instruction; Second Language Learning; Syllables
IDENTIFIERS	Brazil; *Epenthesis

ABSTRACT

This study investigated the role of pronunciation instruction in the acquisition of English word-final consonants by Brazilian students studying English at a Brazilian university. Students participated in either experimental or control groups. Material used for instruction was intended to be appropriate for teaching pronunciation of word-final consonants to beginning Brazilian learners and based on research results in the area of interphonology, taking into account the role of first language interface, different syllabic patterns of English and Brazilian Portuguese, and various degrees of difficulty posed by different word-final consonants in different environments. The main objective was to test the effects of pronunciation instruction by designing a pronunciation manual based on a communicative framework, which was introduced and integrated with the existing language syllabus. Pretest-posttest data indicated that pronunciation instruction facilitated the acquisition of word-final consonants among these students. The experimental group presented lower epenthesis rates following the pronunciation instruction than did the control group. All experimental group students reduced their epenthesis rates in the posttest, compared to only half of the control group students. Epenthesis was the most frequent syllable simplification strategy used to produce English world-final consonants. The pronunciation manual is appended. (Contains 36 references.) (SM)

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THE INFLUENCE OF PRONUNCIATION INSTRUCTION ON THE PRODUCTION OF ENGLISH WORD-FINAL CONSONANTS BY BRAZILIAN LEARNERS

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ED 476 261

This paper was presented at the 2002 TEXFLEC Conference

The present research is an investigation of the role played by pronunciation instruction in the acquisition of English word-final consonants by Brazilian learners. Two groups of Brazilians studying English in an EFL course participated in this study. One group was chosen as the experimental group and the other group was the control group. The material used during the period of instruction was intended to (a) be appropriate for the teaching of pronunciation of word-final consonants to beginning Brazilian learners; and (b) be based on the results yielded by research in the area of interphonology, taking into account the role of L1 interference, the different syllabic patterns of English and Brazilian Portuguese, and the various degrees of difficulty posed by different word-final consonants in different environments. The main objective was to test the effects of pronunciation instruction by designing a pronunciation manual based on a communicative framework, which was introduced and integrated with the existing language syllabus.

INTRODUCTION

Pronunciation instruction was absent from the second/foreign language (L2) classroom for a long time due to conventional beliefs that pronunciation is not important, can be "picked up" by learners, and is difficult to teach. These beliefs have been questioned and pronunciation teaching has undergone a shift, so that nowadays, its frameworks may encompass not only linguistic competence, but also discourse, sociolinguistic, and strategic competence (Morley, 1994).

Morley (1991, 1994) proposes a multidimensional curriculum designed for teaching speaking skills and pronunciation together. Such a curriculum incorporates a focus on microlevel speech production (e.g., vowel and consonant production, stress,

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rhythm and intonation), and on macrolevel speech performance (e.g., non-verbal behavior, command of grammar and vocabulary, fluency, and intelligibility).

As Morley (1991) points out, the pronunciation curriculum has to be based on realistic goals. Therefore, a curriculum that sets out to develop learners' native-like pronunciation is destined to frustrate both learners and instructors, especially if the learners have started learning the L2 after the age of puberty. Morley proposes four realistic learner goals for pronunciation teaching: (a) functional intelligibility, (b) functional communicability, (c) increased self-confidence, and (d) speech monitoring abilities and speech modification strategies for use beyond the classroom. In order to implement theses goals, we need to develop pronunciation and speech methodologies, techniques and materials. Moreover, it is necessary to have controlled studies that investigate the effects of specific pronunciation teaching procedures on the development of learners' pronunciation. The present study focuses on these two needs in the area of pronunciation instruction.

Studies on the effects of pronunciation instruction have addressed different issues: (a) testing the validity of a multimodal methodology (Elliot, 1995; Quijada, 1997), (b) using more controlled teaching techniques (Neufeld, 1977; Strange & Dittman 1984; Jameson & Morosan, 1986), (c) using silent practice as a means to develop perceptual (Mathews, 1997) and productive skills (Neufeld, 1977), (d) testing the effect of immediate feedback (Jameson & Morosan, 1986; Strange & Dittmann, 1984; Mathews, 1997), (e) linking pronunciation to the normal language curriculum (Quijada, 1997), and (f) checking the effect of explicit instruction and visual demonstration of sound articulation (Mathews, 1997). In addition to these issues, some studies have compared the effectiveness of different types of instruction (Macdonald, Yule & Powers, 1994) and checked the delayed effects of pronunciation instruction (Yule, Hoffman & Damico, 1987; Macdonald et al., 1994). The studies mentioned so far are insufficient to provide a conclusive answer about the role played by instruction in the development of pronunciation. While some of the studies indicate that instruction is ineffective (e.g., Macdonald et al., 1994; Quijada, 1997), others argue the opposite (e.g., Elliot, 1995; Mathews, 1997).

The area of pronunciation instruction is controversial also in regard to materials design. An analysis of textbooks (which include pronunciation) and pronunciation manuals used to teach English in Brazil shows that these materials stop short of following

a communicative approach to pronunciation teaching, that is, of emphasizing communicability and intelligibility (e.g., O'Neil, Mugglestone & Anger, 1992; Richards, Hull & Proctor, 1990, 1997; Prator & Robinet, 1985; Orion, 1987; Hagen & Grogan, 1992; Gilbert, 1993; Hewings, 1993).

As regards content selection, most textbooks and pronunciation manuals analyzed ignore a factor that is extremely relevant to pronunciation teaching—the role played by the learner's L1. This is certainly connected with economic factors, for these textbooks and manuals are published to be used in mixed ESL (English as a second language) and EFL (English as a foreign language) classes all over the world. Thus, there is a need for books published in the country where they will be used, and these books should take into account the L1 factor. The literature in the area of second/foreign language acquisition shows that the learner's L1 is a major factor in the acquisition of the L2 phonetic system (e.g., Major, 1994; Carlisle, 1994; Rebello, 1997; Baptista & Silva Filho, 1997). Some studies have shown that learners tend to build their L2 phonetic system upon the L1 system (e.g., Flege, 1987; Baptista, 1992), which makes it difficult for learners to acquire certain features that are somehow different in the L1 and the L2. It seems that a way of trying to cope with this problem is to make learners aware of the differences between the two phonetic systems, as well as show how the inappropriate transfer of L1 system features can hinder communication in the L2. This could help learners realize why they have difficulty making themselves understood while speaking the L2, and hopefully make them more motivated to improve their pronunciation. In addition to motivation, pronunciation teaching should provide learners with activities to minimize the effects of L1 interference and maximize the transfer of features that are common to the L1 and the L2.

Designing pronunciation materials that take into account the learner's L1 requires the careful integration of findings provided by studies in the area of interphonology. In the case of learners whose L1 is Brazilian Portuguese, research has shown that the acquisition of English syllabic patterns is a major difficulty (Fernandes, 1997; Rebello, 1997; Baptista & Silva Filho, 1997; Koerich, 2000). For these learners, the production of certain word-final consonants has proved to be difficult. The difficulty posed by these word-final consonants seems to be related to the differences between English and Brazilian Portuguese (BP) syllable-inventories. In English, all consonants, except for /h/,

can appear in word-final position. Conversely, in BP there are severe restrictions regarding the consonants that can appear in word-final position: /r/, /l/, /m/ and /s/, where /r/ tends to be deleted or pronounced as [x] (e.g., comer "eat" [ko'mex]) and /m/ loses its consonantal feature with the preceding vowel assimilating its nasal feature (e.g., sem "without" [se$^{\tilde{}}$].) As for /l/, it is generally realized as [w], or more rarely, as [ɾ] (e.g., mal "bad" [maw] or [maɾ]). The glides /w/ and /y/ occur without restrictions in word-final position in BP. Due to these constraints on the learners' L1 syllable structure, Brazilian learners of English tend to resort to the epenthetic vowel /i/ or /e/ (Câmara, 1970) to pronounce consonant clusters not permitted in the L1; and the same process takes place in the L2.

In the L1, this process can be exemplified by the pronunciation of the words substituir "substitute" and advogado " lawyer". In BP, these words are separated into syllables as follows: subs-ti-tu-ir (four syllables), and ad-vo-ga-do (four syllables) (Michaellis, 1998). However, the cluster "bs" and the consonant sequence "dv" are unacceptable segments in the phonology of BP, and this is reflected in the pronunciation of such clusters and segments in normal speech: [su.bis.tSi.tu.'ix] (five syllables) and [a.dZi.vo.'ga.du])[4] (five syllables).

Native speakers of BP also resort to an epenthetic vowel to pronounce consonant clusters and final consonants that are not permitted in their L1 with words borrowed from other languages, as illustrated by the English words below:

"club":	clube	['klubi]
"game":	game	['geymi]
"stress":	estresse	[is'trEsi]

Besides; vowel epenthesis is also found in the interlanguage of Brazilian learners of English, and this is illustrated by their pronunciation of words such as "tape" ['teypi], "wife" ['wayfi], and "hush" ['hɐSi].

As we have seen, vowel epenthesis is a very frequent syllable simplification strategy in BP. This strategy can be resorted to with word-final consonants that are not permitted in BP, initial clusters (stop: [is'tap]), medial clusters (MacDonald: [mEki'donawdi]), as well as final clusters (faced: ['feisid]). Baptista and Silva Filho (1997)

propose a hierarchy of difficulty for word-final consonants that takes into account the natural class of the target segments following the word-final consonant (1=least difficult and 4=most difficult):

1. Nasal sonorants (/m/, /n/, /N/)
2. Stops (/p/, /b/, /t/, /d/, /k/, /g/), and within this category, first the bilabials, followed by the alveolars and the velars.
3. Fricatives (/f/, /v/, /s/, /z/, /S/, /Z/)
4. Affricates (/tS/, /dZ/)

Note that within the category of stops, the bilabials are less marked, therefore less difficult to produce, than the alveolars, or velars. As regards voicing, for almost all voiced/voiceless pairs, the voiced consonant in these pairs causes more epenthesis. In addition to (a) voicing, (b) place of articulation, and (c) manner of articulation, environment can contribute to making the pronunciation of final consonants more difficult. In Baptista and Silva Filho (1997), word-final consonants are most difficult to pronounce when followed by a consonant; somewhat easier when followed by a vowel, and easiest when followed by a pause.

Therefore, the acquisition of syllabic patterns, especially of word-final consonants, by Brazilian learners, is an important topic for research, and the results of this research are extremely relevant to the teaching of English pronunciation. Equally important is the investigation of the role played by instruction in the development of L2 learners' pronunciation. Therefore, the present research sets out to investigate the role played by pronunciation instruction in the acquisition of English word-final consonants by Brazilian learners.

It is hypothesized that pronunciation instruction, based on the communicative framework proposed by Celce-Murcia, Goodwin and Brinton (1996), can help these learners to reduce the frequency of vowel epenthesis in the production of word-final consonants. The use of an epenthetic vowel modifies the rhythm of the English language, since it creates an additional syllable, which might also result in word-stress alternation. This affects comprehension by native speakers of English, which is highly dependent on rhythm (Rebello, 1997, Garcia, 1990).

Thus, testing the effects of pronunciation instruction on the acquisition of word-final consonants is a good opportunity to connect theory and practice and to contribute to

the understanding of controversial issues in the area of second language acquisition and teaching, more specifically in the area of interphonology—the study of interlanguage phonology.

THE PRESENT STUDY

The present research is an investigation of the role played by pronunciation instruction in the acquisition of English word-final consonants by Brazilian learners. The study consists of an experiment involving a pretest, followed by a period of instruction, and a posttest. For the instructional period, the researcher elaborated a pronunciation manual, which contains activities that aim at minimizing the production of an epenthetic vowel in the pronunciation of word-final consonants. More specifically, the study aimed at developing materials that (a) are appropriate for the teaching of pronunciation of word-final consonants to beginning Brazilian learners; and (b) are based on the results yielded by research in the area of interphonology, taking into account the role of L1 interference, the different syllabic patterns of English and Brazilian Portuguese, and the various degrees of difficulty posed by different word-final consonants in different environments (Baptista & Silva Filho, 1997; Silva Filho, 1998). Another objective was to test the effects of pronunciation instruction by employing the framework suggested by Celce-Murcia et al. (1996), which is based on the Communicative Approach to second language teaching.

METHOD

Participants

Two groups of Brazilians studying English in the Extracurricular course (level 1) at the Universidade Federal de Santa Catarina participated in this study. The group taught by the researcher was assigned as the Experimental Group, while the group taught by another instructor was the Control Group. The subjects of both groups were mostly undergraduate students from several different courses, and a few were high school students. Only those students who took both the pre and the posttests participated in the study*. The Experimental Group consisted of 9 students, 6 females and 3 males, their age ranging from 17 to 23 (M = 19,8; SD = 2). This group received, during part of their normal class time, eleven weeks of instruction based on the pronunciation manual. The Control Group was composed of 13 students, 9 females and 4 males, their ages

ranging from 15 to 27 (M = 17,5; SD = 2,1). The subjects in this group did not receive any kind of instruction regarding the pronunciation aspects investigated in the present study. Both groups used New Interchange I (Richards, Hull, & Proctor, 1997) as their textbook. The Experimental Group had classes in the evening, while the Control Group had classes in the afternoon.

Pretest/Posttest

The task for the pretest and the posttest consisted of the same set of sentences containing target words with word-final consonants. At the time of the pretest, the subjects also answered a short questionnaire to provide personal information such as name, age, birthplace and language learning experience. The selection of target segments and environment took into consideration Baptista and Silva Filho's (1997) results. Four different versions of the pre and posttest were prepared, in which the same sentences were randomly distributed. The pre/posttests contained 65 sentences, each one containing a word with a target consonant. The target consonants included in the study were: /p/, /b/, /t/, /d/, /k/, /g/, /f/, /v/, /dZ/, /m/, /n/, /N/.

The remaining consonant sounds that can occupy word final position in English were excluded either because they are known to cause additional difficulties for Brazilian learners due to spelling interference or articulation difficulties (/r/, /l/, /D/, and /T/) or for being very infrequent in word-final position (/Z/). The sounds /s/ and /z/ were not tested because they are allowed as word-final consonant codas in Brazilian Portuguese. Initially, the study included the sounds /S/ and /tS/, but they were eliminated from the final analysis due to the extremely low rate of epenthesis they yielded.[v]

Eight target sounds were tested six times, while the remaining four were tested three times each, giving a total of 59 tokens[vi]. The sounds that were tested six times included two target words: one ending in a consonantal grapheme and one ending in the same grapheme followed by a silent "e" (e.g., the sound /d/ was tested 3 times with the target word "mad" and 3 times with the word "made"). The inclusion of words containing a silent "e" was intended to test whether this could be an additional difficulty affecting the pronunciation of word-final consonants. Unfortunately, the sounds /g/ and /N/ could not be tested in the silent "e" condition, since they do not occur in this context (e.g., the letter "g", when followed by an "e" is pronounced as /dZ/), and /v/ and /dZ/ were tested only in the silent "e" environment, equally due to spelling/sound limitations. Two additional

criteria for the selection of the words carrying the target sounds were that they should be monosyllabic and that the target consonant should be preceded by a vowel. Thus, the target consonants were tested in the following environments: V__V (between vowels, e.g., "There is a nice club over there.") – 20 sentences; V__C (preceded by a vowel and followed by a consonant, e.g., "He goes to the club to dance.") – 20 sentences; V__# (preceded by a vowel and followed by a pause, e.g., "I'm going to the club.") – 19 sentences. The vowel sounds following the target consonants were: /oU/, /ɵ/, /E/, /ɨ/, and //, although most of these sounds were generally pronounced somewhat differently by the subjects; for example, /oU/ was pronounced as [o], /ɵ/ as [E], and /ɨ/ as [a]. The consonant sounds following the target consonants were: /p/, /t/, /k/, /v/, /f/, /s/, /h/, /D/, /m/, /n/, and /l/, but the subjects tended to pronounce [D] as [d].

Pronunciation Manual

The pronunciation manual was used with the experimental group, together with the textbook New Interchange I during the instructional period. The manual content was limited to activities that tried to show learners, indirectly and directly, the differences between English and Brazilian Portuguese syllabic patterns for word-final position, and how the use of an epenthetic vowel is an erroneous way to overcome the articulatory problems posed by these differences. The practice activities focused on the 12 word-final consonants that were investigated in the pre/posttest task (see Appendix A).

The manual was organized according to the communicative framework suggested by Celce-Murcia et al. (1996). According to this framework, ideally the pronunciation lesson should consist of five steps: (a) description and analysis; (b) listening discrimination; (c) controlled practice and feedback; (d) guided practice with feedback; and (e) communicative practice and feedback. The activities in the manual were organized according to this framework, with an attempt to integrate the pronunciation component with the remaining language syllabus in terms of grammar and vocabulary and in respect to the learners' level of proficiency. All instructions and explanation regarding pronunciation present in the manual and given in class were in Portuguese.

DATA COLLECTION

The pretest was administered in the second class meeting after the course began, before the pronunciation instruction period for the experimental group started. First, the subjects were asked to speak for one to two minutes in Portuguese in order to verify whether they had any speech problems that could affect the present study. This procedure indicated that one subject from the experimental group had problems distinguishing between voiced and voiceless consonants, and she was eliminated from the study. Before starting the test, the subjects answered the short questionnaire previously described. After recording the speech sample in Portuguese, the subjects took the pretest, which consisted of reading the set of short sentences also described in the Pretest/Posttest section. Their reading was recorded on an audiocassette tape, in a Sony LLC-4500MKZ laboratory. One week after the instructional period with the experimental group was over; the posttest was given to both the experimental and the control groups. The posttest task was the same used for the pretest. In addition to the comparison of the pretest and the posttest results, the study included a comparison of the subjects in the two groups' on one of their written test scores, which were used as the main criterion to evaluate the learners in the language course. This additional comparison was expected to indicate whether the experimental group lagged behind in their knowledge of grammar, listening comprehension skills, and vocabulary, since part of their class time was used to provide pronunciation instruction. All the subjects were enrolled in the first level of an eight-level language course, which means that they either failed the placement test to enroll in more advanced levels, or simply chose not to take the exam. Unfortunately, the subjects did not receive a standardized pretest to assess their initial proficiency regarding their knowledge of English grammar, vocabulary, and listening comprehension skills.

The instructional period started in the first class meeting after the administration of the pretest and was restricted to the experimental group. The focus of the pronunciation instruction was on English syllabic patterns, and its objective was to reduce the occurrence of epenthetic vowels in the production of words containing word-final consonants. The material on which the instruction was based on was the pronunciation manual described previously. The manual was designed following the communicative framework proposed by Celce-Murcia et al. (1996).

The experiment was carried out during a 45-hour language course, taught in one semester and divided into 30 meetings. The classes met twice a week and each session took an hour and a half. For the experimental group, the classes including the pronunciation component were alternated with the general language classes, taking about 30-40 minutes of 10 class meetings during a period of three months. Thus, the total pronunciation instruction time was about 6 hours. Although the activities in the manual focused on pronunciation, because of the integration of this manual with the textbook, they were also an opportunity to practice or revise part of the content presented in the textbook that was used as the main material in the course.

The target words of each sentence produced by all the control and experimental subjects, and their immediate environments, were transcribed phonetically. The data were tabulated and submitted to statistical treatment[vii], with an alpha level of .05. The results reported in the following section address the variables: (a) syllable simplification strategy, (b) pronunciation instruction, (c) markedness of the segments that appear in word-final position (sonority, place and manner of articulation, voicing, and the following environment), (d) orthography, and (e) scores in the written exam.[viii]

RESULTS

The analysis of the data was guided by the following research questions:

(1) What are the main strategies of syllable simplification used by Brazilian learners to produce word-final consonants?

(2) Does pronunciation instruction affect the acquisition of English word-final consonants by Brazilian learners?

(3) Are sonority, voicing, place and manner of articulation relevant criteria to predict the difficulty of word-final consonants?

(4) Can the environment following word-final consonants affect their acquisition?

(5) Does orthography affect the difficulty of production of word-final consonants?

(6) Can pronunciation teaching take too much time away from the rest of the syllabus and, thus interfere with the learning of the rest of the course content?

Strategies of Syllable Simplification

Tables 1 and 2 show that the main strategy of syllable simplification used by the subjects in the production of word-final consonants was epenthesis (experimental group:

pretest = 41.3%, posttest = 22.6%; control group: pretest = 34%, posttest = 33.2%). In addition to epenthesis, the subjects occasionally resorted to devoicing, deletion and substitution of the target consonants. Table 2 compares the rates of epenthesis and devoicing for the voiced obstruents. It shows that there were only a few instances of devoicing for both the experimental group (pretest = 3.7%, posttest = 4.8%) and the control group (pretest = 9.9%, posttest = 6.5%). Deletion with assimilation of the nasal feature to the preceding vowel was a common strategy with the bilabial and alveolar nasals, while substitution was very common with the alveolar stops, the velar nasals, and the voiced palatal affricate, where /t/ and /d/ were frequently pronounced as [tS] or [ts] and [dZ] or [dz], respectively; /N/ as [Ng], and /dZ/ as [Z]. The pronunciation of /t/ and /d/ as affricates is a L1 phonological process found in many Portuguese dialects; the deletion of nasals with assimilation of the nasal feature to the preceding vowel and the pronunciation of /dZ/ as [Z] result from transfer of L1 spelling rules, and the addition of /g/ after /N/ indicates lack of knowledge of the English spelling rules which say that "g" is not pronounced in certain contexts.

Table 1 Frequency of epenthesis per consonant in the pre and posttests of the experimental and control groups (voiced and voiceless consonants).

	Experimental		Control	
	pre	post	pre	Post
Total	219	120	261	255
	(41.3)	(22.6)	(34.0)	(33.2)
Mean	19.8	10.8	23.6	22.9
SD	9.7	4.6	12.8	10.6

* Epenthesis: N (total number of consonants) = 531 (experimental group); 767 (control group)

* Percentages in parenthesis. The means were obtained by multiplying the number of tokens for each target consonant by the number of occurrences of epenthesis for that consonant. The products were then added together and the sum was divided by the total number of tokens for all target consonants.

Table 2. Frequency of epenthesis and devoicing per consonant in the pre and posttests of the experimental and control groups (voiced obstruents only).

	Experimental				Control			
	pre		post		pre		Post	
	epenth	devoic	epenth	devoic	epenth	devoic	epenth	devoi
Total	87	7	40	9	86	27	83	18
	(46.6)	(3.7)	(21.2)	(4.8)	(31.5)	(9.9)	(30.4)	(6.5)
Mean	19.7	1.4	8.8	1.9	19.3	5.4	19.0	3.7
SD	10.0	1.7	2.9	2.5	8.6	5.4	5.2	3.0

* N (total number of consonants) = 189 (experimental group); 273 (control group)

* Percentages in parenthesis. The means were obtained by multiplying the number of tokens for each target consonant by the number of occurrences of epenthesis for that consonant. The products were then added together and the sum was divided by the total number of tokens for all target consonants.

As observed by researchers in the area of interphonology (e.g., Yavas, 1994), the devoicing of word-final consonants is a phonological process found even in the speech of English native speakers. Therefore, L2 learners' devoicing of word-final consonants is likely to cause fewer communication problems for native speakers than epenthesis, which is not a common process in the speech of English native speakers in the mentioned context. Therefore, devoicing was not considered an error in the present study. Moreover, due to the limited contexts where deletion and substitution were frequent, and to the fact that substitution was often accompanied by epenthesis, these two strategies were also disregarded by the present study, which focused on the use of epenthesis as a syllable simplification strategy. This decision is also coherent with the content of the pronunciation manual used with the experimental group, whose activities emphasized the importance of avoiding vowel epenthesis in the production of word-final consonants.

Pronunciation Instruction

The crucial question guiding the present study was whether pronunciation instruction can help learners in the process of acquiring word-final consonants that are not present in the L1. As we have seen, the main strategy of syllable simplification used by the subjects to produce English word-final consonants was vowel epenthesis. The present study aimed at helping the experimental group subjects to gain awareness of the inadequacy of resorting to epenthesis when pronouncing word-final consonants. Table 1 shows the rates of epenthesis for the experimental and the control groups for voiced and voiceless consonants, in the pre and posttests. In the pretest, the rates were slightly higher for the experimental group than for the control group, but this difference was not significant, as demonstrated by a two-tailed t-test for two independent samples with different sizes. This test indicated that the two groups were similar ($p = .28$) before the period of instruction began. In the posttest, only the experimental group's rate of epenthesis per consonant dropped significantly, as demonstrated by the one-tailed t-test for matched pairs ($p = .001$), while the control group's rate remained almost the same ($p = .37$).

Another way of checking the effectiveness of pronunciation instruction is by testing the reduction of epenthesis rates per subject. A positive answer regarding the effectiveness of pronunciation instruction would be obtained if the subjects of the experimental group significantly reduced the frequency of epenthesis in the posttest, compared to the control group. However, due to the small number of subjects, only descriptive statistics was used to illustrate the progress made by the experimental group. As can be seen from Table 3, the pretest mean frequency per subject of the experimental group ($M = 24.3$; $SD = 8.8$) was a little higher than that of the control group ($M = 20.08$; $SD = 10.6$) groups before the instruction began. The results of the posttest indicated that the epenthesis rate of the experimental group decreased dramatically after the instruction ($M = 13.3$; $SD = 7.8$), while for the experimental group it remained very similar ($M = 19.6$; $SD = 12.7$). Moreover, Table 3 shows that the pronunciation instruction helped all subjects in the experimental group reduce the frequency of epenthesis in the production of word-final consonants.

Table 3. Subjects' epenthesis rates in the pre and posttest.

Subjects	Pretest		Posttest		Method
S3	9	15.3	6	10.2	1
S4	36	61.0	27	45.8	1
S5	27	45.8	22	37.3	1
S6	19	32.2	7	11.9	1
S7	21	35.6	8	13.6	1
S11	23	39.0	7	11.9	1
S12	18	30.5	10	16.9	1
S15	31	52.5	12	20.3	1
S16	35	59.3	21	35.6	1
S19	39	66.1	43	72.9	2
S20	23	39.0	15	25.4	2
S21	8	13.6	15	25.4	2
S22	26	44.1	10	16.9	2
S23	12	20.3	8	13.6	2
S24	29	49.2	43	72.9	2
S25	12	20.3	8	13.6	2
S26	26	44.1	21	35.6	2
S28	19	32.2	22	37.3	2
S30	2	3.4	4	6.8	2
S33	12	20.3	14	23.7	2
S38	33	55.9	32	54.2	2
S39	20	33.9	20	33.9	2

* Percentages in italics. Method: 1 = experimental, 2 = control. N (maximum number of consonants subject to epenthesis) = 59

The average progress made by the subjects in the experimental group (M = 11; SD = 5.2) is almost 20 times larger than the control group (M = .46; SD = 7.4). However, it is important to mention that at least 6 subjects in the control group also reduced somewhat the rates of epenthesis. Although the average improvement of these 6 subjects (7.2 percentage points) was much lower than that of the 9 subjects in the experimental group

(28.0 percentage points), these results seem to indicate that other factors might have contributed to help the subjects to achieve a more English-like pronunciation of the target consonants.

Hierarchies of difficulty

Table 4 shows the relationship between the individual consonants and the experimental and the control groups in the pre and posttests. As can be seen, /k/ was definitely the most difficult consonant for both the experimental and the control groups, and /l/ and /n/ tended to be the easiest.

In regards to sonority, the results in Table 4 indicate that there is considerable variation in the degree of difficulty posed by each of the twelve consonants for both the experimental and the control groups, in the pre and posttests. It is difficult to establish a hierarchy of difficulty for word-final consonants based on the limited data gathered by this study, owing to the reduced number of subjects and tokens tested, and the major role played by individual differences.

Table 4. Number of occurrences of epenthesis in the experimental and control groups in the pre and posttests for each consonant.

	Experimental			Control		
	pre	post	N*	pre	post	N*
/p/	6	9	45	19	22	65
	(13.3)	(20.0)		(29.2)	(33.8)	
/b/	20	13	54	17	23	78
	(37.0)	(24.1)		(21.8)	(29.5)	
/t/	28	11	54	33	24	78
	(51.9)	(20.4)		(42.3)	(30.8)	
/d/	31	9	54	32	24	78
	(57.4)	(16.7)		(41.0)	(30.8)	
/k/	39	21	54	55	51	78
	(72.2)	(38.9)		(70.5)	(65.4)	
/g/	10	8	27	13	15	39
	(37.0)	(29.6)		(33.3)	(38.5)	

/l/	19	6	54	14	18	78
	(35.2)	(11.1)		(17.9)	(23.1)	
/v/	10	6	27	15	14	39
	(37.0)	(22.2)		(38.5)	(35.9)	
/dZ/	16	4	27	9	7	39
	(59.3)	(14.8)		(23.1)	(17.9)	
/m/	20	13	54	24	22	78
	(37.0)	(24.1)		(30.8)	(28.2)	
/n/	11	13	54	15	19	78
	(20.4)	(24.1)		(19.2)	(24.4)	
/N/	9	7	27	15	16	39
	(33.3)	(25.9)		(38.5)	(41.0)	

* N = total number of occurrence of each target consonant

Table 5 presents the frequency of epenthesis in relation to sonority, voicing and place and manner of articulation. Nevertheless, the results in Table 5 indicate that the voiced and voiceless obstruents triggered more epenthesis than the nasals in the pretest of the experimental group, and in the pre and posttests of the control group. However, in the posttest of the experimental group, the nasals triggered slightly more epenthesis than the obstruents, and the difference between the two categories was almost neutralized.

As can be seen in Table 5, among the oral and nasal stops together, the velars (53.7%), followed by the alveolars (43.2%), were the most difficult ones for the experimental group in the pretest. In the posttest, the epenthesis rates of the velars (33.3%) continued to be the highest, but the bilabials (22.9%) yielded slightly more epenthesis than the alveolars (20.4%) for the experimental group. The control group performed in a similar manner, with the velars being the most difficult (53.2%), followed by alveolars (34.2%) and bilabials (27.1%) in the pretest. In the posttest, the velars continued to yield the highest epenthesis rates (52.6%), followed by the bilabials (30.3%) and the alveolars (28.6%) again.

Table 5. Frequency of epenthesis in relation to the natural classes for the experimental and control groups in the pre and posttests.

	Experimental			Control		
	pre	post	N*	pre	post	N*
Voiced obstruents	87	40	189	86	83	273
	(46.0)	(21.2)		(31.5)	(30.4)	
Voiceless obstruents	92	47	207	121	115	299
	(44.4)	(22.7)		(40.5)	(38.5)	
Nasals	40	33	135	54	57	195
	(29.6)	(24.4)		(27.7)	(29.2)	
Oral stops	134	71	288	169	159	416
	(46.5)	(24.7)		(40.6)	(38.2)	
Labiodental fricatives	29	12	81	29	32	117
	(35.8)	(14.8)		(24.8)	(27.4)	
Palatal affricates	16	4	27	9	7	39
	(59.3)	(14.8)		(23.1)	(17.9)	
Bilabials	46	35	153	60	67	221
	(30.1)	(22.9)		(27.1)	(30.3)	
Alveolars	70	33	162	80	67	234
	(43.2)	(20.4)		(34.2)	(28.6)	
Velars	58	36	108	83	82	156
	(53.7)	(33.3)		(53.2)	(52.6)	

* N = total number of occurrence of each consonant per class

* Percentages in parenthesis.

In relation to the nasals, the experimental group yielded the highest epenthesis rates with the bilabial, followed by the velar and the alveolar in the pretest. In the posttest, the epenthesis rates decreased for the bilabial (12.9 percentage points) and velar (7.4 percentage points) nasals, but not for the alveolar nasal. Actually, in the experimental group posttest, the differences among the three nasals were neutralized. For the control group, the velar nasal triggered higher epenthesis rates, followed by the bilabial and the

alveolar nasals in the pretest. In the posttest this tendency remained, and the changes in epenthesis rates were minor.

In summary, the present study cannot support or disprove Baptista and Silva Filho's (1997) results regarding the effects of sonority, voicing, place and manner of articulation as relevant criteria to predict the order of difficulty of word-final consonants for Brazilian learners. The reasons for the disagreement might be two-fold. First, the present study dealt exclusively with beginning learners, while Baptista and Silva Filho dealt with learners of several different proficiency levels. Second, this study used a limited number of tokens (3 to 6) and only 1 or 2 different words to test each target consonant, whereas Baptista and Silva Filho had 27 tokens for each target consonant. However, the results indicate that the differences between some of the natural classes (obstruents/nasals, bilabials/alveolars, stops/fricatives/affricates) seem to have been mostly neutralized after pronunciation instruction.

The following environment

The results displayed in Tables 6 and 7 shed some light on the way the environment surrounding word-final consonants affects their production. The tables show that, in the pretest and the posttest for both groups, the context _#V yielded higher epenthesis rates than the contexts _# and _#C, which yielded similar epenthesis rates in all four situations. Table 6 also shows that, although in the posttest the experimental group's rate of epenthesis dropped considerably in all of the three contexts, the period of instruction did not seem to affect the order of difficulty of the environments, with _#V remaining as the most difficult. For the control group (Table 7), the epenthesis rates in the posttest remained similar to the pretest in all contexts. These results are contrary to Baptista and Silva Filho's (1997), since in their study the context _#C was found to yield the highest epenthesis rates.

Table 6. Experimental group's frequency of epenthesis in the pre and posttest, according to target consonants and their following contexts.

	Experimental					
	pre			post		
	_#	_#V	_#C	_#	_#V	_#C
Total	63	94	56	22	61	28
	(36.8)	(52.2)	(32.1)	(12.9)	(33.9)	(15.6)

*Percentages in parenthesis.

* N (total number of consonants per context) = _# (171), _#V (180), _#C (180)

Table 7. Control group's frequency of epenthesis in the pre and posttest, according to target consonants and their following contexts.

Control					
pre			post		
_#	_#V	_#C	_#	_#V	_#C
75	102	65	69	101	63
(30.4)	(39.2)	(25.0)	(27.9)	(38.8)	(24.2)

*Percentages in parenthesis.

* N (total number of consonants per context) = _# (247), _#V (260), _#C (260)

Orthography

Table 8 displays the frequency of epenthesis in relation to orthography by including only the consonants that were tested in the two contexts: with a target word ending with a consonantal grapheme (e.g., mad) and with a target word ending in the same grapheme followed by a silent "e" (e.g., made). A total of eight consonants appeared in both contexts: /p/, /b/, /t/, /d/, /k/, /f/, /m/, /n/. The results indicate that th factor orthography plays an important role in the frequency of epenthesis in the production of word-final consonants by Brazilian learners of English. For both the experimental and the control groups, it is clear that the words containing the silent "e" triggered more epenthesis than those that ended with the consonantal grapheme. This is especially true for the nasals, which, when not spelled with a silent "e", tended to undergo

another L1 process, namely, the deletion of the final consonant and the nasalization of the preceding vowel, thus eliminating the context for the occurrence of epenthesis. In the posttest, there was a reduction in the epenthesis rate in both the words ending in a consonantal grapheme and the words ending in the same grapheme followed by a silent "e" for the experimental group, while for the control group the rates remained very similar in both contexts. Once again the instruction led to less frequent epenthesis, but did not affect the relative difficulty of the words ending in silent "e" compared to those without.

Table 8. Frequency of epenthesis in relation orthography for the experimental and the control groups in the pre and posttest.

	Experimental				Control			
	pre		post		pre		post	
	C	Ce	C	Ce	C	Ce	C	Ce
Total	63	111	26	69	83	126	81	122
	(29.2)	*(53.6)*	*(12.0)*	*(33.3)*	*(26.6)*	*(42.1)*	*(26.0)*	*(40.8)*

* Percentages in italics.

* N (total number of consonants) = experimental group: C (216) and Ce (207) control group: C (312) and Ce (299)

Pronunciation Instruction and the Language Syllabus

Finally, the last research question was whether pronunciation instruction interfered with learning by taking too much time away from the rest of the syllabus and, thus interfering with the learning of the rest of the course content by the experimental group subjects. This was checked by making a comparison between the two groups' performance on one of the two written tests that were used as the main criterion to evaluate the learners in the language course. This additional comparison indicated that the experimental group did not lag behind in their knowledge of grammar, listening comprehension skills, and vocabulary, since their mean in the first exam was even higher (M = 9.29; SD = 0.38) than the one obtained by the control group (M = 8.25; SD = 1.12).

DISCUSSION

The present study was designed to test the effect of pronunciation instruction in the acquisition of word-final consonants. In addition, the study aimed at testing some results obtained in previous studies regarding the acquisition of word-final consonants.

The crucial question guiding the present study was whether pronunciation instruction could facilitate the acquisition of word-final consonants. The results obtained by this study point to a positive answer to this question, since the experimental group presented lower epenthesis rates after receiving pronunciation instruction, contrary to the control group, whose epenthesis rates were very similar in the pre and posttest. Furthermore, all subjects in the experimental group reduced their epenthesis rates in the posttest, while only 6 of the 13 subjects in the control group did. And the epenthesis rates were reduced for 10 out of 12 target consonants in the experimental group, and for only 6 of the consonants in the control group. It is important to point out that the experimental group epenthesis rate reductions per consonant were significant, but the same was not true for the control group. Moreover, the experimental group's epenthesis rates per subject reduced considerably, contrary to the control group; but due to sample size limitations, the significance of these reductions could not be assessed.

Corroborating the results of Baptista and Silva Filho's (1997) study, the present study found that epenthesis was the most frequent syllable simplification strategy used by Brazilian learners to produce English word-final consonants. The present study also tested whether voicing, the environment following the target consonant and orthography influenced the epenthesis rates. As regards voicing, the variability present in the data makes it difficult to draw any conclusions. In relation to the environment following the word-final consonant, it was found that, contrary to Baptista and Silva Filho's (1997) and Edge's (1991) findings, the context _#V triggered more epenthesis than _# or _#C. Finally, orthography appeared to be a relevant factor in determining the rates of vowel epenthesis, with words ending with a consonantal grapheme followed by a silent "e" triggering higher epenthesis rates than those ending in a consonantal grapheme only. Moreover, spelling also caused subjects to transfer L1 processes such as the deletion of nasals, with the preceding vowel assimilating the nasal feature, and the substitution of alveo-palatal affricates for alveolar stops.

As already mentioned, the environment following the word-final consonant also influenced the epenthesis rates, with the context _#V triggering the highest rates, a finding in conflict with those of Baptista and Silva Filho (1997). Also, the acquisition of word-final consonants is subject to the effects of orthography, which can favor the interference of L1 phonological processes. This last result indicates the relevance of teaching spelling rules for L2 learners.

Finally, this study found that, although pronunciation instruction occupied part of the experimental group class time, it did not interfere with the learning of the rest of the syllabus content. This result was found by comparing the grades of the experimental and the control group subjects in the written exam. Probably, the integration of the pronunciation instruction with the course syllabus prevented the experimental group from lagging behind in their knowledge of grammar, listening comprehension skills and vocabulary, compared to the control group. However, as the subjects did not receive a standardized test to measure their previous knowledge of these skills, it is possible that the experimental and the control groups had different proficiency levels before the study began.

CONCLUSION

As the data investigated by the present study were limited, the results presented here should be treated with a great deal of caution. Nevertheless, there seems to be evidence that pronunciation can facilitate the acquisition of word-final consonants, since the experimental group subjects succeeded at reducing the epenthesis rates per consonant significantly in their posttests. All subjects in the experimental group reduced their epenthesis rates considerably after receiving instruction, and some subjects from the control group presented reduced epenthesis rates to some extent in the posttest. This suggests that there might be other factors influencing the acquisition of word-final consonants (e.g., simple exposure to the language, language aptitude), since pronunciation instruction cannot account for this improvement.

In the present study, the experimental and the control groups were taught by different instructors. This might have interfered with the results concerning the effectiveness of the pronunciation instruction used with the experimental group. Future research should control for this variable by having the same instructor working with both groups.

As regards previous interphonology studies on the acquisition of word-final consonants, this study does not clearly corroborate Baptista and Silva Filho (1997) on any counts except for epenthesis being the principal strategy of the participants to deal with final consonants, and clearly contradicts the earlier study regarding environment. Differences in research design might have contributed to the different results. Further research should be carried out in order to clarify the results obtained by the two studies.

The pronunciation manual used with the experimental group was meant to be used to teach pronunciation based on Celce-Murcia et al.'s (1996) framework. While using the material with the experimental group, it was possible to detect some of its limitations. The major difficulties were to design and implement some of the more communicative tasks and to integrate the pronunciation content with that presented by the textbook used by both groups in terms of grammar and vocabulary. Despite the problems identified, it seems to be a valuable resource to help Brazilians who are learning English at the beginning level to acquire word-final consonants. Further research is necessary to corroborate or question this finding.

Despite its limitations, this study represents an important contribution to the area of pronunciation teaching, for it brings together theory, research and practice in the development and testing of pronunciation materials. Although the integration between theory, research and classroom practice has been absent in the area of pronunciation instruction, it is fundamental for the development of this area (Morley, 1991; Baptista, 2000, Silveira, 2001). More studies are necessary to test for the benefits of this integration, and to devise new ways of accomplishing it.

A further limitation of the present study is that it dealt exclusively with beginning learners. This made it difficult to design a task to collect more naturalistic speech samples, owing to the subjects' difficulty in performing this type of task at the time the pretest was given. Thus, the present study cannot make any claims regarding the effects of pronunciation instruction in more naturalistic speech contexts, since the subjects were tested only in a sentence-reading task. Future research should address the effectiveness of pronunciation instruction with more proficient learners in order to collect and compare speech samples that range from more to less formal. Studies with more proficient learners could also investigate whether these learners are more resilient to change than beginners.

NOTES

[i] From now on, the term L2 will be used as referring to both second and foreign language, unless it is necessary to make a distinction between them.

[ii] See Collischonn (1996) and Monaretto, Quednau and Hora (1996)

[iii] The palatalization of /t/ and /d/ when they are followed by the vowel /i/ is a phonological process commonly found in many dialects of BP: dia "day" ['dZia], tia "aunt" ['tSia] (Cristófaro, 1999).

[iv] Nearly 50% of the students of both the experimental and control groups were eliminated from the study because they were absent on either the pre or posttest days. This was due mainly to the time both tests were given. The pretest was given in the second class after the course began, and after this date, several students joined the experimental group. By then, the treatment with the pronunciation instruction material had begun, so it was not possible to ask those students to do the pretest. The posttest was given in the first week of June, when most students were taking exams in their curricular courses, which caused the rate of absence in the extracurricular courses to be high.

[v] /S/: experimental group = 7.4% for the pre and posttests; control group = 0% for the pretest and 7.7% for the posttest; /ʃS/: experimental group = 14.8% for the pretest and 0% for the posttest; control group = 2.6% for the pretest and 5.1 for the posttest.

[vi] A word-final /p/ in the context V__# was inadvertently omitted from both the pre and posttest.

[vii] The statistical packages used were: Microsoft Excel 2000 and the Statistical Package for Social Sciences (SPSS/SPADWIN).

[viii] Due to the duration of the experiment, it was not possible to check the subjects' performance on the second written test.

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APPENDIX A

Pronunciation Manual
Designed to accompany the book New Interchange I
Extracurricular Courses – UFSC
Rosane Silveira/2001

TABLE OF CONTENTS

Tasks, vocabulary field, and related units from New Interchange I

I. The phonetic alphabet

2. The syllable (1): the weather
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5. /μ/, /ν/, and /N/: numbers (unit 3); general questions (units 1 and 2); present tense (units1 and 2)
6. /ɱ/ and /ɸ/: irregular plurals (unit 3); jobs (unit 2); adjectives
7. /ʃV, /δ/, and /γ/: general vocabulary, adjectives
8. /ɾ/, /ɾ/, and /ĸ/: colors (unit 3), numbers (unit 3)

SAMPLE LESSON
UNIT 5. THE CONSONANTS /μ/ /ν/ /N/

Ouça as palavras em (1) e preste atenção na pronúncia da letra "m".
Listen to the words in (1) and pay attention to the pronunciation of the letter "m".

(1) team am same time gym
simple

⇒ O som da letra "m" é representado pelo símbolo /m/. Pratique a pronúncia das palavras em (1).
The sound of the letter "m" is represented by the symbol /m/. Practice the pronunciation of the words in (1).

Ouças as palavras em (2) e preste atenção na pronúncia da letra "n":
Listen to the words in (2) and pay attention to the pronunciation of the letter "n".

(2) ten man send sentiment

O som da letra "n" é representado pelo símbolo /n/. Pratique a pronúncia das palavras em (2).
The sound of the letter "n" is represented by the symbol /n/. Practice the pronunciation of the words in (2).

bAs letras "m" e "n" são pronunciadas da mesma forma no início e no final das sílabas. Compare as palavras em (3) e (4)

The letters "m" and "n" are pronounced the same way in the beginning and the end of syllables.

(3)

March	am	morning	film
my	gym	simple	more

(4)

no	ten	never	sin
nice	pencil	not	man

A letra "n" pode ser pronunciada de uma outra forma. Ouça as palavras em (5):
The letter "n" can be pronounced in a different way. Listen to the words in (5):

(5) sing strong song think pink

O som da letra "n", quando seguida de "g" ou "k" é representado pelo símbolo /N/. Pratique a pronúncia das palavras em (5).
The sound of the letter "n", when followed by "g" or "k" is represented by the symbol /N/. Practice the pronunciation of the words in (5).

bLembre-se: A letra "e" geralmente não é pronunciada em final de palavras. Mas as letras "m" e "n" têm de ser pronunciadas no final das sílabas, estejam elas seguidas de "e" ou não. Ouça as palavras em (6) e pratique-as.
Remember: The letter "e" is not generally pronounced in word-final position. But the letters "m" and "n" must be pronounced in word-final position, whether they are followed by an "e" or nor. Listen to the words in (6) and practice them.

(6)

/m/		/n/		/N/
team	time	win	wine	sing
Sam	same	pin	pine	thing
cream	crime	mean	mine	thank

a) Ouça as palavras abaixo e circule a palavra de cada par que você ouvir. Depois pratique-as com um colega. Seu colega vai circular a palavra que ouvir.
Listen to the words below and circle the one you hear for each pair. Then practice them with a partner. Your partner will circle the word he or she hears.

A		*B*		*C*	
say	same	bee	bean	sin	sing
see	seem	lie	line	win	wing
cry	crime	me	mean	thin	thing
tea	team	play	plane	ham	hang
tie	time	say	sane	swim	swing

b) Leia os textos na página 19 (*New Interchange* I-A) e sublinhe todas as palavras que contêm os sons /m/, /n/ e /N/ em posição final.
Read the texts on page 19 (*New Interchange* I-A) and underline all the words containing the sounds /m/, /n/ and /N/ in word-final position.
c) Leia novamente os textos na página 19 e preste atenção na pronúncia dos sons /m/, /n/ e /N/. Escolha um dos textos e grave-o.
Read the texts on page 19 again and pay attention to the pronunciation of the sounds /m/, /n/ and /N/.

d) Com um colega, pratique a pronúncia de algumas das palavras retiradas dos textos da página 19.
With a partner, practice the pronunciation of some of the words taken from the texts on page 19.

in	television	some	than	item	American
often	began	home	phone	on	soon
anything	shopping	clothing	things	can	interesting

e) Pair Work: Você costuma fazer compras? Olhe as gravuras que a professora vai entregar e adivinhe o preço aproximado de cada item. Depois, confira os preços exatos no cartao que a professora vai entregar.

Pair Work: Do you usually go shopping? Look at the pictures the teacher is going to give you and guess the approximate price for each item. Then, check the exact prices in the card the teacher will give you.

Exemplo: A: How much is the ...?
B: It's about ..... dollars.

ITEM	APPROXIMATE PRICE (IN US$)
the pair of golden earrings	.....
the television set	.....
the film roll	.....
the ice-cream cone	.....
the phone card	.....
the can of beer	.....
the video game	.....
the walkman	.....
the disc-man	.....
the diamond ring	.....
the bottle of red wine	.....
the vacuum cleaner	.....
the swim suit	.....
the pair of in-line skates	.....
the king-size bed	.....
the ping-pong rackets	.....

f) Pense em 5 perguntas usando as palavras abaixo e discuta com um colega para ver se as perguntas estão corretas. Em seguida, entrevistem-se usando as perguntas que vocês elaboraram.
Think of 5 questions using the words below and work with a partner to check whether the questions are correct. Then, you and your partner should interview each other using the questions you made.

- Name
- Phone number
- Where from
- Occupation
- Activities on the weekend

g) Miming: Siga as instruções da professora.
Follow the teacher's instructions.

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